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Yield, nutrient utilization and soil properties in a melon crop amended with wine-distillery waste compost

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In Spain, large quantities of wine are produced every year (3,339,700 tonnes in 2011) (FAO, 2011) with the consequent waste generation. During the winemaking process, solid residues like grape stalks are generated, as well as grape marc and wine lees as by-products. According to the Council Regulation (EC) 1493/1999 on the common organization of the wine market, by-products coming from the winery industry must be sent to alcohol-distilleries to generate exhausted grape marc and vinasses. With an adequate composting treatment, these wastes can be applied to soils as a source of nutrients and organic matter.

A three-year field experiment (2011, 2012 and 2013) was carried out in Ciudad Real (central Spain) to study the effects of wine-distillery waste compost application in a melon crop (Cucumis melo L.). Melon crop has been traditionally cultivated in this area with high inputs of water and fertilizers, but no antecedents of application of winery wastes are known. In a randomized complete block design, four treatments were compared: three compost doses consisted of 6.7 (D1), 13.3 (D2) and 20 t compost ha-1 (D3), and a control treatment without compost addition (D0). The soil was a shallow sandy-loam (Petrocalcic Palexeralfs) with a depth of 0.60 m and a discontinuous petrocalcic horizon between 0.60 and 0.70 m, slightly basic (pH 8.4), poor in organic matter (0.24%), rich in potassium (410 ppm) and with a medium level of phosphorus (22.1 ppm). During each growing period four harvests were carried out and total and marketable yield (fruits weighting <1 kg or visually rotten were not considered), fruit average weight and fruit number per plant were determined. At the end of the crop cycle, four plants per treatment were sampled and the nutrient content (N, P and K) was determined. Soil samplings (0-30 cm depth) were carried before the application of compost and at the end of each growing season and available N and P, as well as exchangeable K content were analyzed.
With this information, an integrated analysis was carried out with the aim to evaluate the suitability of this compost as organic amendment.

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